## TYPHOONS AND DEPRESSIONS OVER THE FAR EAST, OCTOBER 1936

By Rev. BERNARD F. DOUCETTE, S. J.

[Weather Bureau, Manila, P. I.]

Four typhoons and two depressions occurred during October 1936 over the regions of the Far East. Of these storms, the most noteworthy is the typhoon (Oct. 7 to 16) which formed in the Pacific Ocean, moved across Luzon and reversed its course just after entering the China Sea.

*Typhoon, September 25 to October 4.*—A depression appeared in the Pacific about 500 miles east of northern Luzon, moved slowly northwest, recurved to the northeast and was located September 28 about 700 miles east of Formosa. Thus far it had manifested no signs of great intensity, but as it turned westward it became very severe. The morning of October 1 found it about 90 miles south-southwest of Naha recurving sharply to the northeast. It moved rapidly along this course, changing to the north-northeast as it touched the coast of central Japan, passing close to and south of Tokyo. No complete reports of the damage resulting from this typhoon reached Manila newspapers. Naha reported, October 2, 6 a. m., a barometer of 738 mm (29.005 inches), with west-northwest winds, force 8, as the typhoon center was about 60 miles north-northeast of the station.

*Typhoons, October 7 to 16.*—An extensive low pressure trough reaching from the Philippines to the eastern Caroline Islands finally developed into two typhoons, one near the Philippines, the other over the Pacific Ocean, between Guam and Yap. These two disturbances are described as follows:

The most important of these storms, because of its peculiar course, appeared as a depression, about 500 miles east by north of Manila, and moved northwest, then west, intensifying on the evening of October 7 into a typhoon. The morning of the 9th, the typhoon was close to and south of Echague, Isabela Province, gradually inclining to the west-southwest. Its motion now was decreasing, probably due to the rough mountainous country over which it was passing, as its course lay to the southeast of Baguio, Mountain Province, and Dagupan, Pangasinan Province. The morning of October 10 it was located near or over the coast line. From this point, it moved very slowly west and the next morning, it had reversed its course, after moving southward for a while. It crossed the northern part of Zambales Province, moving eastward (Oct. 11) and was located about 60 miles north of Manila on the morning of October 12. It changed to the north-northeast, at the same time moving more rapidly. It shifted to the northeast as it entered the Pacific, and slight traces of its existence were found until October 16.

The reversal of the course on October 11 was due to the rapid building up of an anticyclone over China. The strong northeasterly winds over Formosa Channel and the northern China Sea, together with the rising pressures reported from Chinese stations, gave indications that the westward motion of the typhoon would certainly be checked, so that, when the storm appeared to be stationary throughout October 10, the easterly course was not unexpected.

There were two minima reported from stations along the course of this typhoon, those of October 9 being the lower. The lowest value reported was that at Echague, October 9, 5:45 a. m., namely, 731.98 mm (28.818 inches) with northwest winds force 8. Dagupan, on October 9, 4:45 p. m., recorded a value of 738.30 mm (29.067 inches) with winds force 4. The stations at Tuguegarao, Cagayan Province, Vigan, Ilocos Sur Province, San Fernando, La Union Province, Olongapo and Iba, Zambales Province, Baler and Infanta, Tayabas Province, and Manila reported values between 740 mm and 750 mm (29.134 inches and 29.528 inches). These values are corrected for gravity.

Great destruction resulted as this typhoon moved across Luzon on its west-southwest course, October 9. The rains caused extensive floods which did great damage to property and was the cause of the loss of many lives, a total of 517 dead being published in the newspapers of October 16. The provinces of Nueva Ecija and Zambales suffered the most. The typhoon fortunately was very much weakened as it moved eastward across Luzon and very little damage occurred after October 11.

The steamship *Chicago Maru* passed through the typhoon center October 11, 4 a. m., latitude 15°45′ N., longitude 119°15′ E., experiencing northwest winds force 3 and a barometric minimum of 29.10 inches, (739.14 mm). The sea was very high but not confused, stars were visible, and birds covered the rigging of the ship. Before the ship reached the center (the ship was en route to Manila, southerly course), while under the influence of the north-quadrant winds, very little rain fell, but after passing into the region of the southwest winds, gusty rain squalls with thunder and lightning were experienced. The same day, but late in the afternoon, the steamship *Phemius* left Manila but, on entering the China Sea, found such a high sea with hurricane winds, that she returned to her anchorage. Because of this adverse weather just outside Manila Bay, many ships were delayed and could not enter port until the typhoon had weakened and moved away.

Simultaneously with this typhoon, another disturbance had formed and was following its course far away over the Pacific Ocean. Forming between Guam and Yap, it moved west-northwest for 4 days, and then recurved to the north-northeast near latitude 17° N., longitude 129° E., on the forenoon of October 11. Changing to the northeast it moved rapidly toward the Bonin Islands. When about 90 miles west of these islands, it again moved on a north-northeast course proceeding to the one hundred and fiftieth meridian, which it crossed October 14.

*Typhoon, October 13 to 21.*—A depression appeared northeast of Guam, moved west-northwest for 1 day, intensifying as it proceeded. It then moved west until the afternoon of October 15, then west by north, to latitude 17°30′ N., longitude 132° E. There it took a north-northwest course and approached Naha. When about 60 miles south-southeast of this island (Oct. 18, afternoon), it sharply recurved to the northeast, moving even more rapidly than before. Two days later the typhoon was beyond the 150th meridian.

On October 14 and 15, the steamship *Corabank* was under the influence of this typhoon. The typhoon approached the vessel, passed close to and south of her position, October 15, 1000 Greenwich mean time. The ship was then near latitude 17°10′ N., longitude 136°50′ E., the position given at 1230 Greenwich mean time. The lowest value of pressure reported by the ship was 29.20 inches (741.68 mm) October 15, 0700 Greenwich mean time at latitude 16°50′ N., longitude 136°30′ E., with tendency to fall. The steamship *Marthara* reported October 16, 0000 Greenwich mean time from latitude 20° N., longitude 136° E., northeast gales, precipitous sea from the northeast, barometer 29.53 inches (750.06 mm) falling. These radio reports give an indication of the intensity and rapidity of movement of this disturbance.

*Depression, October 22 to 27.*—A depression moved rapidly northwest from a position about 200 miles south-southeast of Guam. On the 24th and 25th it proceeded more slowly and then recurved near latitude 20°, longitude 130° (Oct. 26) and disappeared October 27 between Japan and the Bonins.

*Depression, October 25 to 28.*—A depression, apparently of minor importance, was central in latitude 17° N., longitude 131° E., on October 25. It moved northwest for 1 day, recurved to the northeast, and was lost October 28, probably having filled up.

# CLIMATOLOGICAL TABLES

## CONDENSED CLIMATOLOGICAL SUMMARY

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

*Condensed climatological summary of temperature and precipitation by sections, October 1936*

[For description of tables and charts, see REVIEW, January, p., 29]

| Section | Temperature | | | | | | | | Precipitation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Monthly extremes | | | | | | | | Greatest monthly | | Least monthly | |
| | Section average | Departure from the normal | Station | Highest | Date | Station | Lowest | Date | Section average | Departure from the normal | Station | Amount | Station | Amount |
| | °F. | °F. | | °F. | | | °F. | | *In.* | *In.* | | *In.* | | *In.* |
| Alabama | 67.1 | +2.4 | Thomasville | 94 | 8 | 2 stations | 30 | 31 | 2.12 | −0.90 | Riverton | 10.09 | Lock no. 1 | 0.00 |
| Arizona | 63.5 | +.3 | 2 stations | 106 | [1] 10 | do | 20 | [1] 20 | .81 | −.02 | Junipine | 3.72 | 3 stations | .00 |
| Arkansas | 61.1 | −1.5 | Crossett | 93 | 5 | Eureka Springs | 24 | 27 | 5.00 | +1.83 | Lutherville | 8.65 | Rogers | 2.98 |
| California | 61.4 | +.9 | Palm Springs | 109 | [1] 11 | Portola | 12 | 5 | 1.22 | −.01 | Mount Wilson | 6.44 | 5 stations | .00 |
| Colorado | 46.3 | −.4 | Cheyenne Wells | 90 | 12 | Pearl | −3 | 22 | 1.17 | .00 | Hawthorne | 3.25 | Buena Vista | .06 |
| Florida | 75.6 | +2.5 | Cedar Keys | 99 | 6 | Vernon | 38 | 31 | 5.50 | +1.24 | Fort Pierce | 16.41 | Belle Glade | 1.65 |
| Georgia | 67.2 | +2.3 | 2 stations | 93 | 1 | 2 stations | 28 | 31 | 3.87 | +1.10 | Brunswick | 8.65 | Sparta | 1.09 |
| Idaho | 48.2 | +1.2 | 2 stations | 89 | [1] 9 | Obsidian | −1 | [1] 28 | .33 | −1.14 | Lifton | 1.83 | 19 stations | .00 |
| Illinois | 55.4 | +.3 | Harrisburg | 88 | 19 | Freeport | 16 | 27 | 3.23 | +.48 | Carbondale | 6.79 | Keithsburg | .78 |
| Indiana | 55.1 | +.3 | Shoals | 87 | [1] 6 | La Porte | 17 | 27 | 4.44 | +1.67 | Seymour | 7.50 | Evans Landing | 2.62 |
| Iowa | 50.9 | −.6 | Guthrie Center | 88 | 18 | Rock Rapids | 10 | 26 | 1.69 | −.68 | Fairfield | 6.76 | Inwood (near) | .15 |
| Kansas | 55.2 | −1.7 | Phillipsburg | 92 | 12 | Oberlin | 12 | 22 | 1.82 | −.14 | Sedan | 7.16 | Norton | .33 |
| Kentucky | 58.5 | +.3 | Pikeville | 88 | [1] 8 | Anchorage | 24 | 27 | 3.47 | +.74 | Maysville | 6.12 | Glasgow | 1.87 |
| Louisiana | 68.2 | −.2 | New Orleans, no. 2 | 95 | 6 | Tallulah | 33 | 30 | 2.22 | −1.01 | Robeline | 5.91 | 2 stations | .40 |
| Maryland-Delaware | 57.7 | +1.6 | Cumberland, Md | 85 | 20 | 2 stations | 16 | 28 | 3.24 | +.22 | Emmitsburg, Md | 6.02 | Solomons, Md | .81 |
| Michigan | 46.7 | −2.4 | St. Ignace | 82 | 6 | Dukes | 4 | 27 | 3.03 | +.19 | Roscommon (near) | 4.98 | Calumet | .64 |
| Minnesota | 42.5 | −3.8 | Wheaton | 88 | 8 | Roseau | −16 | 26 | .68 | −1.25 | Albert Lea | 2.96 | Gonvick | T |
| Mississippi | 66.1 | +.7 | Kosciusko | 96 | 6 | 2 stations | 31 | 31 | 1.76 | −.85 | Booneville | 7.56 | Kipling | T |
| Missouri | 56.7 | −.7 | Nevada | 89 | 5 | do | 20 | 27 | 3.55 | +.63 | Dean | 8.87 | Memphis | 1.01 |
| Montana | 46.5 | +1.9 | 2 stations | 89 | [1] 8 | Outlook | −7 | 22 | .59 | −.43 | Red Lodge (near) | 2.39 | Dillon | T |
| Nebraska | 50.3 | −1.2 | Alma | 92 | 12 | Gordon | 0 | 22 | .38 | −1.12 | Pawnee City | 2.46 | 2 stations | .00 |
| Nevada | 52.8 | +2.4 | Logandale | 98 | [1] 9 | Beowawe | 12 | [1] 28 | .76 | +.20 | Sharp | 2.93 | do | .00 |
| New England | 49.4 | −.1 | Turner Falls, Mass | 83 | [1] 9 | Somerset, Vt | 7 | 28 | 4.54 | +1.02 | Lincoln, N. H | 6.97 | Block Island, R. I | 2.08 |
| New Jersey | 55.6 | +.9 | Burlington | 82 | 22 | Layton | 9 | 28 | 3.40 | −.01 | Ridgefield | 4.84 | Bridgeton | 1.80 |
| New Mexico | 52.2 | −1.4 | Carlsbad | 95 | 20 | Therma | 11 | 7 | .60 | −.53 | Gavilan (near) | 2.46 | 3 stations | .00 |
| New York | 50.4 | +.4 | 3 stations | 81 | [1] 20 | Indian Lake | 6 | 28 | 4.54 | +1.23 | Salisbury | 9.74 | Dansville | 1.49 |
| North Carolina | 62.5 | +2.5 | Goldsboro | 89 | 7 | Banners Elk | 22 | 31 | 6.11 | +2.73 | Tryon | 14.25 | Parker | 2.05 |
| North Dakota | 42.3 | −1.2 | 2 stations | 90 | 8 | 4 stations | −5 | [1] 21 | .21 | −.88 | Pembina | .83 | Ashley | .00 |
| Ohio | 54.2 | +.8 | Gallipolis (near) | 88 | 6 | Holgate | 18 | 28 | 4.00 | +1.42 | Cambridge | 9.16 | Cleveland | 1.78 |
| Oklahoma | 59.2 | −3.0 | Altus | 92 | 19 | 2 stations | 22 | 27 | 2.91 | −.09 | Tulsa | 7.11 | Kenton | .25 |
| Oregon | 51.3 | +1.7 | Powers | 103 | 9 | Austin | 0 | 31 | .13 | −1.75 | Tillamook | 1.74 | 23 stations | .00 |
| Pennsylvania | 54.0 | +1.5 | Meadville | 87 | 7 | Gouldsboro | 11 | 28 | 3.69 | +.49 | Natrona | 6.13 | Philadelphia Navy Yard | 1.30 |
| South Carolina | 65.8 | +2.1 | Beaufort (near) | 93 | 24 | Chester | 26 | 31 | 6.14 | +3.08 | Caesars Head | 15.07 | Edgefield | 1.86 |
| South Dakota | 47.5 | −1.0 | Faith | 91 | 8 | 2 stations | −3 | 26 | .40 | −.80 | Faith | 1.58 | Pollock | T |
| Tennessee | 60.8 | +.8 | Union City | 87 | 19 | Dover | 27 | 28 | 4.02 | +.96 | Coldwater | 7.18 | New Tazewell | 1.99 |
| Texas | 63.6 | −4.1 | Alice | 99 | 9 | 2 stations | 25 | [1] 26 | 2.44 | −.32 | Honey Grove | 6.76 | Presidio | .00 |
| Utah | 49.3 | +.4 | Hanksville | 95 | 8 | Woodruff | 14 | 29 | 1.64 | +.55 | Alton | 3.35 | Salina | .18 |
| Virginia | 59.5 | +2.1 | Diamond Springs | 88 | 10 | Big Meadows | 19 | 28 | 3.66 | +.72 | North River Dam | 7.49 | Walkerton | 1.02 |
| Washington | 52.8 | +3.2 | Kosmos | 94 | 10 | Pomeroy | 11 | 21 | .69 | −2.43 | Wishkah Headworks. | 5.02 | 5 stations | .00 |
| West Virginia | 56.5 | +1.9 | 2 stations | 89 | [1] 9 | Alpena | 12 | 28 | 3.89 | +1.08 | Pickens | 7.50 | Roanoke | 2.07 |
| Wisconsin | 44.9 | −3.2 | Grantsburg | 83 | 8 | Laona | 2 | 23 | 2.26 | −.21 | Shawano | 4.73 | Mondovi | .35 |
| Wyoming | 43.4 | .0 | Cody | 87 | 11 | Hunter's Station | −5 | 22 | 1.01 | −.08 | Middle Forks | 4.31 | Deaver | .20 |
| Alaska (September) | 45.0 | +.1 | Treepoint | 79 | 30 | Fort Yukon | 7 | 14 | 3.09 | −.71 | Little Port Walter | 20.73 | Fort Yukon | .14 |
| Hawaii | 74.9 | +1.2 | Waimanalo | 94 | [1] 15 | Kanalohuluhulu | 44 | 5 | 10.64 | +5.14 | Piihonua | 30.00 | Ka Lae | .33 |
| Puerto Rico | 77.0 | −.8 | 2 stations | 96 | [1] 4 | Guineo Reservoir | 45 | [1] 17 | 7.83 | −.38 | La Mina (El Yunque). | 37.17 | Central San Francisco. | .85 |

[1] Other dates also.